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Towards a Unified Definition of Web Accessibility

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ABSTRACT

To better understand what researchers and practitioners consider to be the key components of the definition of web accessibility and to propose a unified definition of web accessibility, we conducted an analysis of 50 definitions of web accessibility. The definitions were drawn from a range of books, papers, standards, guidelines and online sources, aimed at both practitioners and researchers, from the across the time period of web accessibility work, from 1996 to 2014 and from authors in 21 different countries. The analysis extracted six core concepts that are used in many definitions, which are incorporated into a unified definition of web accessibility as “all people, particularly disabled and older people, can use websites in a range of contexts of use, including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts”.

Categories and Subject Descriptors

H.3.5 [Online information services]: Web-based services. K.4.2 [Social Issues]: Assistive technologies for persons with disabilities.

General Terms

Design, Human Factors.

Keywords

Web accessibility, people with disabilities, older people, practitioners and researchers in web accessibility

1. INTRODUCTION

Making the web accessible and usable by people with disabilities and older people has been a topic of considerable importance since early in its development [1, 2, 3, 4]. However, there is no widely agreed definition of web accessibility, although there are several well-known statements, such as Berners-Lee’s [5] succinct and clear statement that “it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities”. In

addition, the relationship between web accessibility and web usability is unclear and subject to some debate [6, 7, 8].

Is it a problem that there is no widely agreed and used definition? Web accessibility is a complex and multi-component concept, which perhaps needs a range of definitions. However, from a scientific point of view, having a complete, unified definition of web accessibility would provide a basis for guiding empirical studies that explore the relationship between the components of the concept and the relationship of web accessibility to other concepts such as web usability. As a research community, we should be able to speak with certainty about what we are varying and what we are controlling for in our studies in relation to a unified definition, making studies more comparable and making clearer what is new knowledge. From the point of view of understanding the accumulated knowledge about web accessibility, a unified definition is needed in order to judge progress and identify gaps in our existing knowledge with reference to each of the different components of the concept. From a design point of view, in order to move web design and assistive technologies forward, designers and developers require a definition that encompasses all components of web accessibility. Without such a definition, designers and developers run the risk of having only a portion of the picture of what will impact disabled and older users in their interactions with the web. Otherwise important aspects may be left out of design. An agreed and complete definition would allow designers and developers to interrogate their work in relation to the different components, allowing them to be more critical of their designs in a more structured way.

Petrie and Kheir [7] addressed the problem of the definition conceptually and more recently Yesilada et al [8] undertook a survey on this topic. The authors of this latter paper asked a wide range of people involved and interested in web accessibility for their opinions and comments on five different definitions of web accessibility [6], [9, 10, 11, 12]. From a large number of respondents (they obtained 300 valid responses), they found that the most popular definition, chosen by 45% of respondents, was the definition given by the WAI [9] “web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate and interact with the Web, and that they can contribute to the Web”. The second most popular definition, chosen by 32% of respondents, was from the Section 508 Amendment of the Rehabilitation Act in the USA [10] that “technology is accessible if it can be used as effectively by people with disabilities as those without”. Preference for these two definitions was regardless of respondent age, country, work sector or profession. There was a stronger preference amongst respondents with a scientific/technical education for the first definition, but this was not tested statistically. While these results

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are interesting, it is not clear whether there is a familiarity factor at work - respondents may have been choosing the definitions they have seen most often. This is hinted at by the fact that people with scientific/technical educations chose the WAI definition more frequently, as it may well be that they have been more exposed to this definition. So it would have been useful to ask respondents which definitions they were familiar with.

In this paper we have decided to take a different, yet complementary, approach to that taken by Yesilada et al [8]. We have gathered many different definitions from the extensive literature on web accessibility and conducted a conceptual analysis of these definitions, in order to better understand what are considered the key components of the definition of web accessibility by the practitioner and research community and to propose a unified definition of web accessibility, drawing on all these components.

2. METHOD

As part of a larger project, a comprehensive web search was conducted in four digital libraries (Google Scholar, ACM Digital Library, IEEE Xplore, Science Direct). Search terms were “website/web site/web-site/webpage/web page/web-page accessibility” and “accessibility of website/web site/web-site/webpage/web page/web-page”. No time period was set for the search, although of course, all the papers returned were published after the invention of the Web in 1989, and most papers were published after 1995 when interest in web accessibility substantially increased.

From this pool of papers we then searched for papers which provided definitions of web accessibility. This has been achieved by searching for possible introductions of definitions with terms such as “web accessibility is ...”, “web accessibility means ...”, “web accessibility aims ...” “definition of web accessibility ...” and by manually skimming the Introduction and Background sections of papers.

This search has so far produced a total of 75 papers with definitions, four from guidelines and standards documents [9, 10, 11, 12] and 71 from published papers, books and online documents. All definitions are definitions of web accessibility in general, although some of the documents are about specific aspects of the concept, for example web accessibility for a particular user group. Papers which provided definitions about a particular aspect of web accessibility when not included in the corpus.

For this paper and as an initial test of our proposed approach, a sample of 50 definitions was analysed. This sample was taken from across the time period of web accessibility work, from 1996 to 2014, and included four guidelines and standards documents, 37 academic papers, three online documents and six books for practitioners. We deliberately sought to include materials used by practitioners as well as researchers, hence the inclusion of books for practitioners and online documents. In addition, we deliberately sought to represent an international view of web accessibility, so the definitions are proposed by authors from 21 different countries, including all continents apart from Africa (although one paper did investigate the accessibility of websites in Africa [13]): Asia (Bangladesh India, Japan, Korea, Malaysia, Sri Lanka, Taiwan), Australasia/Oceania (Australia), Europe (Cyprus, France, Germany, Italy, Portugal, Romania, Spain and the UK) and the Americas (Argentina, Brazil, Canada, Ecuador, and the USA). The definitions are listed in the Appendix, with the sources, countries of the authors, and the antecedents of the

definition and the authors understanding of web accessibility in general.

The analysis of the definitions was conducted in two phases. Firstly, all relevant content words were extracted from the definitions; grammatical variations (operate, operability) and close synonyms (anyone, all users) were grouped together. Secondly, all the content words were grouped into concepts. All these analyses were checked by at least two of the authors, and any errors or omissions corrected. Six concepts emerged from the analysis, these are summarized in Table 1.

The analysis of the antecedents was conducted as follows: for antecedents to the definitions, only sources explicitly referred to in presenting the definition were noted. For “general antecedents”, the reference list of the document was studied and all references cited which were known to offer a definition of web accessibility were noted. We realize this second analysis is currently incomplete, as we have not been able to check every reference to see whether it offered a definition. This analysis is continuing, but some comments are made below on the results so far.

3. RESULTS

Table 1 shows the number of definitions that included the six different concepts, including the number of important specific examples within the concepts. For example, 49 of the 50 definitions referred to groups of users or the characteristics of users, whether users with disabilities (35 definitions), or all users or as many users as possible (12 definitions). Interestingly, only three of the definitions referred explicitly to older users, although this user group is often considered within the scope of web

Table 1. Concepts used in the 50 definitions of web accessibility

Concept	Explanation, examples (with frequencies)	Number of definitions mentioning
Groups of users, characteristics, needs of users	with disabilities (35), all users/as many as possible (12), characteristics (12), specific disabled groups (4)	49 (98%)
What users should be able to do	access (20), use (15), interact (9), navigate (7), understand (5), perceive (4), available (3), achieve goals (2), contribute (2), benefit/get/perform/reach/visit (1 each)	44 (88%)
Technologies used	mainstream technologies (10), assistive technologies (5)	15 (30%)
Characteristics of the website	usability or aspects of usability (efficiency, effectiveness etc)	15 (30%)
Design and development of the website	design (5), standards/guidelines (3)	12 (24%)
Characteristics of the situations of use	in specified contexts of use (3), in environmental constraints (3)	7 (14%)



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Figure 1: Six core concepts of web accessibility emerging from the analysis of 50 definitions

accessibility and constitutes an important and growing proportion of the population. The fact that this group is not often mentioned means that many researchers and practitioners may not realize it might be a relevant group, or forget to consider it in working on web accessibility.

A further result of interest is the wide number of terms used to describe what people should be able to do as a result of web accessibility. Firstly, a large number of definitions use circular definitions – defining accessibility in terms of access (20 out of 50 definitions). Strictly speaking that is not useful, but it is understandable, as authors are concentrating on explaining other parts of the concept – the users, the technologies involved etc.

It is also interesting that the WAI definition of web accessibility [9] offers an excellent set of user actions: “... can use ... can perceive, understand, navigate and interact with the Web”. Yet few authors use these terms in full (Harper and Yesilada [14] being a notable exception), and it is disappointing that Harper and Yesilada are the only authors to mention the ability to contribute as part of web accessibility.

We also analysed the antecedents that authors quoted in relation to offering a definition of web accessibility. Surprisingly few authors refer back to previous definitions (24% of our sample) and very rarely discuss why they are proposing a new definition in comparison to a cited previous definition. This makes it very difficult to analyse what authors perceive to be the problems of previous definitions. However, a majority of authors (66%) do make general citations to previous papers or standards which offer definitions. So these authors likely are aware of previous definitions, even if they do not explicitly refer to them when offering their definition.

From this analysis we can put the concepts together into a unified definition of web accessibility that almost perfectly reflects the strength of importance of the concepts, as expressed by the frequency of mention in the 50 definitions. We can illustrate this in a “layers of the onion” diagram, shown in Fig. 1, with the most important concepts at the core of the onion and concepts of less importance towards the skin of the onion.

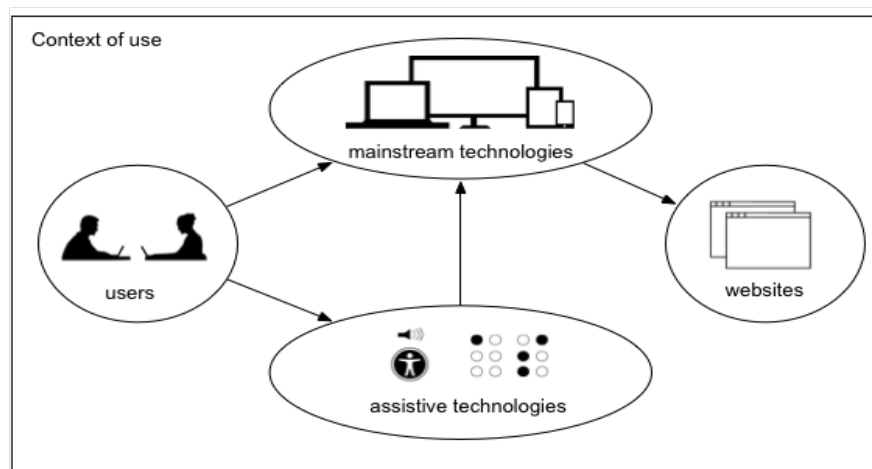
From the onion diagram we can extract the following definition of web accessibility: “all people, particularly disabled and older people, can use websites in a range of contexts of use, including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts”.

This definition is long, but it includes all the components we have identified in web accessibility; this comprehensiveness we believe is part of its strength. Figure 2 illustrates all the components of the definition and how they relate to each other.

4. DISCUSSION AND CONCLUSIONS

In this paper we set out to better understand what researchers and practitioners consider to be the key components of the definition of web accessibility and to propose a unified definition of web accessibility, drawing on all these components. To achieve this aim we analysed 50 definitions of web accessibility, drawn from a range of books, papers, standards, guidelines and online sources, aimed at both practitioners and researchers, from the across the time period of web accessibility work, from 1996 to 2014 and from an international selection of authors.

The analysis has led to a unified definition of web accessibility. This definition may be rather long, but accessibility is a complex concept with a large number of different components that are



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Figure 2: The core components of web accessibility

seldom all represented in any single definition. The “onion” diagram we have developed shows how the key concepts embedded within the unified definition fit together and makes the definition clearer for both practitioners and researchers.

There was one element of the definitions that we were surprised by that bears further investigation. Only three of the definitions included references to older adults specifically in their list of users. While these users are no doubt included in the “all users” or “anyone” related references, it is odd that they appear in so few definitions. This is odd as much of the research literature, and certainly practitioner resources, refer to older users as being within the scope of web accessibility and given that older people are an important and growing sector of the population.

This work was conducted as part of a larger literature review about web accessibility and as more papers with definitions of web accessibility are found in this review, this analysis and our unified definition of web accessibility will be refined. This paper demonstrates that, while there is often debates and conflict around the definition of web accessibility, most viewpoints and definitions about web accessibility can be reconciled into a single shared definition. We hope that this definition, which brings together many concepts from different definitions of web accessibility, will be useful to both practitioners and researchers in the field.

5. ACKNOWLEDGEMENTS

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- [4] Paciello, M.G. 1996c. The Web and People with Disabilities: Cutting Edge Developments. *Florida Libraries*, 39.
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- [14] Harper, S. and Yesilada, Y. 2008. Web accessibility. In Harper, S., Yesilada, Y. (eds), *Web accessibility: A foundation for research*. Springer Berlin Heidelberg.

Appendix. 50 definitions of web accessibility.

Source	Reference	Country	Definition	Antecedents to definition	General Antecedents
Standards and guidelines					
Section 508 (1996)	Access Board, US Government: Section 508. 1996. Available at www.section508.gov	USA	Technology is accessible if it can be used as effectively by people with disabilities as by those without.		
WAI/W3C (2005)	W3C WAI. 2005. Introduction to Web Accessibility. Available at http://www.w3.org/WAI/intro/accessibility.php	International	... people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.		
ISO 9241-171 (2008)	International Standards Organization (ISO). 2008. Accessibility Guidelines for Information Communication Technology (ICT) Equipment and Services (ISO 9241-20), ISO, Geneva.	International	... the usability of a product, service, environment or facility by people with the widest range of capabilities.		
BSI (2010)	British Standards Institute (BSI). 2010. Web Accessibility Code of Practice (BS 8788:2010), BSI, London.	UK	The extent to which a website can be used by users with specified disabilities to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.		
Books, papers, online documents					
Paciello (1996)	Paciello, M.G. 1996. Making the web accessible for the deaf, hearing, and mobility impaired. <i>Florida Libraries</i> , 39, 83-91.	USA	... the ability for [web] browsers to render information in a manner that is accessible to people with disabilities. For the blind, any aspect of a graphic interface presents barriers. For low vision web surfers (and in some cases, those with cognitive limitations), data presentation in different formats, different fonts, and inconsistent character and word spacing, make reading online information difficult. For the deaf, rendering sounds or sound bytes presents significant challenges.		
Berners-Lee (1997)	Berners-Lee, T. 1997. W3C Leads program to make the web accessible for people with disabilities (Press release on launch of WAI). Available at http://www.w3.org/Press/WAI-Launch.html	USA	... it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities.		
Letourneau (1998- 2009)	Letourneau, C.: 1998-2009. Accessible web design – A definition. Available at www.starlingweb.com/webac.htm	Canada	... anyone using any kind of web browsing technology must be able to visit any site and get a full and complete understanding of the information as well as have the full and complete ability to interact		

			with the site if that is necessary.		
Waddell (1998)	Waddell, C.D. 1998. Applying the ADA to the internet: A web accessibility standard. Paper presented at the American Bar Association National Conference. Available at http://lists.w3.org/Archives/Public/w3c-wai-ig/1998AprJun/0336.html	USA	...the design of a webpage ... in order to ensure that all users can access the information on the page.		
Sierkowski (2002)	Sierkowski, B. 2002. Achieving web accessibility. In <i>Proceedings of the 30th Annual ACM SIGUCCS Conference on User Services</i> (Providence, RI November 20 – 23, 2002). ACM, New York, NY, 288-291. DOI= http://dx.doi.org/10.1145/588646.588725	USA	Web accessibility is the ability for a person using any user agent (software or hardware that retrieves and renders web content) to understand and fully interact with a website's content. The idea of accessibility is based on more than the implementation of standards; it embodies the idea that everyone has the right to be included in society, regardless of disability, geographical location, language barriers, or any other factor. (p 288)	Thatcher et al (2002)	Section 508 WCAG
Slatin and Rush (2002)	Slatin, J.M. and Rush, S. 2002. <i>Maximum accessibility: Making your website more usable for everyone</i> . Addison- Wesley Longman Publishing, Boston.	USA	... individuals with disabilities can access and use them [websites] as effectively as people who don't have disabilities. (p 3)		
Thatcher et al (2002)	Thatcher, J., Bohman, P., Burks, M., Henry, S.L., Regan, B., Swierenge, S., Urban, M.D., and Waddell, C.D. 2002. <i>Constructing Accessible Web Sites</i> . Glasshaus, Birmingham, UK.	USA	... people being able to get and use web content. It is about designing web pages that people can present and interact with according to their needs and preferences. A primary focus of accessibility is access by people with disabilities. The larger scope of accessibility includes benefits to people without disabilities ... Accessibility is a subset of a more general pursuit: usability. (p 7)		Section 508 WCAG
Abascal, Arrue, Garay and Tomás (2003)	Abascal, J. Arrue, M. Garay, N., and Tomás, J. 2003. A web service for automatic accessibility analysis of web pages based on the use of XML structures. In <i>Proceedings of the 10th International Conference on Human-Computer Interaction</i> (Crete, Greece, June 22 – 27, 2003). Lawrence Erlbaum Associates, Hillsdale, NJ, 925-929.	Spain	Web Accessibility refers to the possibility of accessing any web content by anyone regardless to circumstances such as impairments, platforms, devices, browsers, etc. (p 925)		WCAG
Lazar et al (2003)	Lazar, J., Schroeder-Thomas, C., Jones, A., Greenidge, K., Beere, P., and Clements, J. 2003. Detour ahead: Current roadblocks to web accessibility. In <i>Proceedings of the 2nd</i>	USA	An accessible web site is a web site that can be successfully used by people with various disabilities. People with different disabilities may be using different forms of assistive technology, such as		Section 508 WCAG Slatin and Rush (2002)

	<i>International Conference on Universal Access in Human-Computer Interaction (UAHCI)</i> (Crete, Greece, June 22 – 27, 2003). Lawrence Erlbaum Associates, Hillsdale, NJ, 990-994.		screen readers, alternative keyboards, or alternative pointing devices. A web site that is accessible is flexible enough to work with these various assistive technology devices. (p 990)		
Thompson, Burgstahler and Comden (2003)	Thompson, T., Burgstahler, S., and Comden, D. 2003. Research on web accessibility in higher education. <i>Journal of Information Technology and Disabilities</i> , 9(2) (December 2003).	USA	The bottom line with respect to web accessibility is whether an individual can perform a website's intended function(s). As there will be varying degrees in the ease with which users can do so, such a measure does not lend itself to a binary "approved" or "not approved" rating. With this in mind, the evaluator of any web page should (a) identify its perceived intended function(s) and (b) rate the page on a scale that measures the ease with which any user, including a user with a disability, can perform the intended function(s).		Section 508 WCAG
Hackett, Parmanto and Zeng (2004)	Hackett, S., Parmanto, B., and Zeng, X. 2004. Accessibility of Internet websites through time. In <i>Proceedings of the 6th International ACM SIGACCESS Conference on Computers and Accessibility</i> (ASSETS '04) (Atlanta, GA, USA, October 18 – 20, 2004). ACM, New York, 32-39. DOI= http://dx.doi.org/10.1145/1029014.1028638	USA	Accessibility, when pertaining to a Web page, means that information has been made available for use by almost everyone, including persons. with disabilities. This accessibility may be direct or through the use of assistive technologies.		Section 508 WCAG
Abanumy, Al-Badi and Mayhew (2005)	Abanumy, A., Al-Badi, A., and Mayhew, P. 2005. e- Government website accessibility: In-depth evaluation of Saudi Arabia and Oman. <i>The Electronic Journal of e- Government</i> , 3(3) (December 2005) 99-106.	UK	Web accessibility refers to the degree to which web information is accessible to all human beings and automatic tools. The goal of web accessibility is to allow universal access to information on the web, by all people but especially by people with any impairment, no matter what its severity, (e.g. blindness, low vision, deafness, hard of hearing, physical disabilities or cognitive disabilities). In addition, the information must be accessible by automatic machine tools. (p100)	Letourneau (1998- 2009)	Section 508 WCAG
Mankoff, Fait and Tran (2005)	Mankoff J., Fait, H., and Tran, T. 2005. Is your web page accessible?: A comparative study of methods for assessing web page accessibility for the blind. In <i>Proceedings of the SIGCHI Conference on Human Factors in Computing Systems</i> (Portland, Oregon, USA, April 2 – 7, 2005) (CHI '05), ACM, New York, 41-50. DOI= http://dx.doi.org/	USA	Web accessibility involves making web content available to all individuals, regardless of any disabilities or environmental constraints they experience. (p 41)		Section 508 WCAG Paciello (2000) Thatcher et al (2002)

	10.1145/1054972.1054979				
Maswera, Dawson, and Edwards (2005)	Maswera, T., Dawson, R. and Edwards, J. 2005. Analysis of usability and accessibility errors of e-commerce websites of tourist organisations in four African countries. In <i>Proceedings of the Conference on Information and Communications Technologies in Tourism</i> (Innsbruck, Austria January 26 – 28 2005), Springer Wien, pp. 531–542.	UK	... the most important component in web accessibility is addressing issues relevant to individuals with disabilities and the elderly (p532)	Letourneau (1998)	WCAG Sierkowski (2002)
Brajnik (2006)	Brajnik, G. 2006. Web accessibility testing: When the method is the culprit. In Miesenberger, K., Klaus, J., Zagler, W., Karshmer, A. (eds.) <i>Proceedings of the 10th International Conference on Computers Helping People with Special Needs (ICHP) 2006</i> . LNCS, vol. 4061, Springer Berlin Heidelberg, 156-163.	Italy	Sometimes accessibility is defined in terms of effective- ness; now and then it is defined in terms of usability; but unfortunately there are too often claims that a web site is accessible simply because an automatic accessibility testing tool yielded no error.		Section 508 WCAG Slatin and Rush (2002)
Chen, Chen and Shao (2006)	Chen, Y.-L., Chen, Y.-Y., and Shao, M. 2006. 2005 accessibility diagnosis on the government web sites in Taiwan, R.O.C. In <i>Proceedings of the 2006 International Cross-disciplinary Workshop on Web Accessibility (W4A): Building the Mobile Web: rediscovering accessibility?</i> (Edinburgh, Scotland, UK, May 22 - 23, 2006) (W4A '06). ACM, New York, 132-142. DOI = http://dx.doi.org/10.1145/1133219.1133243	Taiwan	In general, accessible websites are able to give everyone equal opportunities to access the complete Web content regardless of software, hardware and user ability.	Sierkowski (2002)	Section 508 WCAG
Iaccarino, Malandrino and Scarano (2006)	Iaccarino, G., Malandrino, D., and Scarano, V. 2006. Personalizable edge services for web accessibility. In <i>Proceedings of the 2006 international cross-disciplinary workshop on Web accessibility (W4A)</i> (Edinburgh, Scotland, UK, May 22 - 23, 2006) (W4A '06). ACM, New York, 23-32. DOI= http://dx.doi.org/10.1145/1133219.1133224	Italy	More specifically, Web accessibility means that people with disabilities can easily navigate and interact with the Web.		WCAG
Jaeger (2006)	Jaeger, P. T. 2006. Assessing Section 508 compliance on federal e-government web sites: A multi-method, user- centered evaluation of accessibility for persons with disabilities.	USA	For a web site to be accessible, it should provide equal or equivalent access to all users, and it should work compatibly with assistive technologies such as narrators, screen enlargement, and many other		Section 508 WCAG Thompson, Burgstahler and

	<i>Government Information Quarterly</i> , 23(2) (June 2006), 169-190. DOI= http://dx.doi.org/10.1016/j.giq.2006.03.002		devices that persons with disabilities may employ to navigate cyberspace. (p170)		Comden (2003) Slatin and Rush (2002)
Craven and Nietzio (2007)	Craven, J. and Nietzio, A. 2007. A task-based approach to assessing the accessibility of web sites. <i>Performance Measurement and Metrics</i> , 8(2) (2007), 98–109. DOI= http://dx.doi.org/10.1108/14678040710760603	UK Germany	The term web accessibility can refer to the provision of physical access to appropriate hardware and software to enable access to the web; it can mean the provision of add-on technologies to widen access to the web, for example through the use of assistive technologies such as screen reading software, screen magnification, alternative mouse devices, and voice input. Web accessibility can also refer to the design of the web interface which, according to recommended standards and guidelines, should be presented in a way that can be interpreted by as wide a group of user as possible and by any kind of assistive technology. (p 98 – 99)		WCAG
Henry (2007)	Henry, S. 2007. Just ask. Integrating accessibility throughout design. Lulu Books, Raleigh NC.	USA	... means that people with disabilities can use a product (p 2)		Section 508 WCAG
Kane (2007)	Kane, S. 2007. Everyday inclusive web design: an activity perspective. <i>Information Research</i> , 12(3) (April 2007). Available at http://www.informationr.net/ir/12-3/paper309.html	USA	Web accessibility refers to the degree to which a website may be accessed by people with varying abilities.		WCAG Section 508 Paciello (2000)
Petrie and Kheir (2007)	Petrie, H. and Kheir, O. 2007. The relationship between accessibility and usability of websites. In <i>Proceedings of the SIGCHI Conference on Human Factors in Computing Systems</i> , (San Jose, California, USA) (CHI '07), ACM, New York, 397-406. DOI= http://dx.doi.org/10.1145/1240624.1240688	UK	... the ultimate criteria for accessibility should be user- based and we can adapt the ISO 9241 definition for this purpose: the extent to which a product/website can be used by specified users with specified disabilities to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. (p 397)		WCAG Brajnik (2006) Thatcher et al (2002)
Watanabe, Asai and Asano (2007)	Watanabe, M., Asai, D., and Asano, Y. 2007. Improving accessibility through the visual structure of web contents. In <i>Proceedings of the 4th International Conference on Universal Access in Human-Computer Interaction, UAHCI 2007 Held as Part of HCI International</i> . (Beijing, China, July 22 - 27, 2007). 185-192. DOI= 10.1007/978-3-540-73283-9_22	Japan	Web accessibility means the ability [of websites] to be accessed by all kinds of people or devices.		WCAG
Chisholm and May (2008)	Chisholm, W. and May, M. 2008. <i>Universal design for web applications</i> . O'Reilly Media, Sebastapol,	USA	... to increase usability for people with disabilities and in scenarios involving mobile and embedded		WCAG

	CA.		devices. (p xi)		
Harper and Yesilada (2008)	Harper, S. and Yesilada, Y. 2008. Web accessibility. In Harper, S., Yesilada, Y. (eds), Web accessibility: A foundation for research. Springer Berlin Heidelberg.	UK Cyprus	Web accessibility aims to help these people [who have disabilities] to perceive, understand, navigate, and interact with, as well as contribute to, the Web, and thereby the society in general. This accessibility is, in part, facilitated by the Web Content Accessibility Guidelines (WCAG) currently moving from version one to two. (p 61)	WCAG	Section 508
Freire, Fortes, Turine, and Paiva (2008)	Freire, A.P.,-Fortes, R.P.M., Turine, M.A.S. and Paiva, D.M.B. 2008. An evaluation of web accessibility metrics based on their attributes. In <i>Proceedings of the 26th annual ACM International Conference on Design of Communication</i> (Lisbon, Portugal, September 22 - 24, 2008) SIGDOC '08. ACM, New York, NY, 73-79. DOI=	Brazil	Accessibility is a concept related to providing access to Web content to people with different abilities and people using different devices. (p73)		Berners-Lee (1997)
Leporini and Paternò (2008)	Leporini, B. and Paternò, F. 2008. Applying web usability criteria for vision-impaired users: Does it really improve task performance? <i>International Journal of Human-Computer Interaction</i> , 24(1) (January 2008), 17-47. DOI= 10.1080/10447310701771472	Italy	... it is important that the information be easily reachable by all, including people with disabilities. (p 17) Accessibility is aimed specifically at making Web sites more available to a wider population of users (including special categories) by removing the technical barriers that prevent access to the information included in the site (p 17)		Abascal, Arrue, Fajardo, Garay and Tomas (2003) Section 508 WCAG Mankoff, Fait, and Tran (2005)
Borrino, Furini and Roccetti (2009)	Borrino, R., Furini, M., and Roccetti, M. 2009. Augmenting social media accessibility. In <i>Proceedings of the 2009 International Cross-Disciplinary Conference on Web Accessibility (W4A)</i> (Madrid, Spain, April 20 - 21, 2009) (W4A '09). ACM, New York, 54-57.	Italy	Web accessibility means that people with disabilities, including older people with changing abilities, can perceive, understand, navigate, and interact with the Web. (p55)		
Alexandru and Alecu (2010)	Alexandru, A. and Alecu, C. S. 2010. Introducing engineering students to telemedicine. Case study. In <i>Proceedings of the 7th WSEAS International Conference on Engineering Education. World Scientific and Engineering Academy and Society (WSEAS)</i> . (Corfu, Greece, July 22 – 24, 2010) 465-469.	Romania	Web accessibility refers to making the World Wide Web accessible and available to everyone, including people with disabilities and senior citizens.		WCAG
Bradbard, Peters, and Caneva (2010)	Bradbard, D. A., Peters, C., and Caneva, Y. 2010. Web accessibility policies at land-grant universities. <i>The Internet and Higher Education</i> .	USA	Web accessibility is the practice of making Web sites accessible to people who require more than just traditional Web browsers to access the Internet.		Section 508, WCAG, Hackett,

	13(4) (May 2010), 258-266. DOI= http://dx.doi.org/10.1016/j.iheduc.2010.05.007				Parmanto and Zeng (2005)
Isaila and Nicolau (2010)	Isaila, N. and Nicolau, I. 2010. Promoting computer assisted learning for persons with disabilities. <i>Procedia-Social and Behavioral Sciences</i> , 2(2), (May 2010), 4497 - 4501. DOI= http://dx.doi.org/10.1016/j.sbspro.2010.03.719	Romania	Web accessibility refers to persons with disabilities which access the Web content. From this point of view, Web accessibility means a web design that allows people with disabilities to interact with Web pages effectively.	WCAG	
Lopes and Carrico (2010)	Lopes, R. and Carrico, L. 2010. Macroscopic characterisations of web accessibility. <i>New Review of Hypermedia and Multimedia</i> , 16(3) (December 2010), 221-243. DOI= http://dx.doi.org/10.1080/13614568.2010.534185	Portugal	Web accessibility is an umbrella term for the study of the adequacy of Web technologies to users with special needs such as people with blindness, cognitive disabilities, etc. This adequacy can be viewed from two perspectives: (1) stricter, where accessibility means the ability to access (e.g. a person with blindness cannot grasp information conveyed in images); and (2) broader, where the term represents how easily these users can interact with a Web page.	WCAG	
Martín, Mazalu and Cechich (2010)	Martín, A., Mazalu, R., and Cechich, A. 2010. Supporting an aspect-oriented approach to web accessibility design. In <i>Proceedings of the Fifth International Conference on Software Engineering Advances (ICSEA)</i> , (Nice, France, August 22 – 27) (2010), IEEE, 20-25. DOI= http://dx.doi.org/10.1109/ICSEA.2010.10	Argentina	Web Accessibility means universal access on the Web, regardless the kind of hardware, software, network platform, language, culture, geographic location and users' capabilities.	WCAG	
Wijayaratne and Singh (2010)	Wijayaratne, A. and Singh, D. 2010. Is there space in cyberspace for distance learners with special needs in Asia? A review of the level of web accessibility of institutional and library homepages of AAOU members. <i>The International Information and Library Review</i> , 42(1) (February 2010), 40-49. DOI= http://dx.doi.org/10.1016/j.iilr.2010.01.002	Sri Lanka Malaysia	Accessibility is making the content of a Website available to everyone, including those with physical disabilities and cognitive learning problems.		Section 508 WCAG Thompson, Burgstahler and Comden (2003)
Belingardi and Obradovic (2011)	Belingardi, G. and Obradovic, J. 2011. Experience of use of advanced communication systems and distance learning to support teaching at Politecnico di Torino. <i>International Journal of Industrial Engineering and Management (IJIEM)</i> , 2(4) (2011), 159-163.	Italy	Web accessibility refers to the ability to use content and services independently of the disability and hardware and software availability.	WCAG	
Lazar et al (2011)	Lazar, J., Wentz, B., Bogdan, M., Clowney, E., Davis, M., Guiffo, J., Gunnarsson, D., Hanks, D., Harris, J., Holt, B., Kitchin, M., Motayne, M.,	USA	Web accessibility is the concept of making sure that web sites can work properly for users with disabilities that are using alternative input or output devices,	Section 508 WCAG	Jaeger (2006) Mankoff, Fait and Tran (2005)

	Nzokou, R., Sedaghat, L., and Stern, K. 2011. Potential pricing discrimination due to inaccessible web sites. In <i>Proceedings of the 13th IFIP TC 13 International Conference on Human-Computer Interaction</i> . (Lisbon, Portugal, September 5 – 9 2011). Springer Berlin Heidelberg, 108-114.		such as screen readers or adaptive keyboards.		
Baowaly and Bhuiyan (2012)	Baowaly, M. K. and Bhuiyan, M. 2012. Accessibility analysis and evaluation of Bangladesh government website. In <i>Proceedings of the 2012 International Conference on Informatics, Electronics & Vision (ICIEV)</i> , (Dhaka, Bangladesh, May 18 -19, 2012), 46-51. DOI= http://dx.doi.org/10.1109/ICIEV.2012.6317487	Bangladesh	Accessibility in terms of web design generally refers to facilitating the use of technology for people with disabilities with any impairment, not matter what its severity.... The accessibility can be defined as the quality of a web site that makes it possible for people to use it - to find it navigable and understandable - even when they are working under limiting conditions or constraints.	Henry (2006)	WCAG
Grantham, Grantham and Powers (2012)	Grantham, J., Grantham, E., & Powers, D. (2012, January). Website accessibility: an Australian view. In <i>Proceedings of the Thirteenth Australasian User Interface Conference (AUIC 2012)</i> . (Melbourne, Australia, January 202) 126, 21-28	Australia	Website accessibility refers to the practice of making websites accessible to all users inclusive of race, nationality, religion and disability. Website accessibility includes, but is not limited to, the communication style of the text as well as the technical development of the website.		Section 508 WCAG
Márquez et al (2012)	Márquez, S., Moreno, F., Coret, J., Jiménez, E., Alcantud, F., and Guarinos, I. 2012. Web accessibility for visual disabled: An expert evaluation of the Inclusive® solution. In <i>Proceedings of the 15th International Conference on Interactive Collaborative Learning</i> (Villach, Austria, September 26 – 28 2012) ICL, IEEE, New York, 1-5. DOI= http://dx.doi.org/10.1145/2379636.2379657	Spain	Web accessibility refers to the ability to access web and its contents for all people regardless of the disability they have from (physical, cognitive or sensorial disability), or disabilities arising from the use contexts (technological or environmental contexts)” (p 1)		WCAG
Mereuță, Aupetit and Slimane (2012)	Mereuță, A., Aupetit, S., and Slimane, M. 2012. Improving web accessibility for dichromat users through contrast preservation. In <i>Proceedings of the 13th international conference on Computers Helping People with Special Needs</i> , (Linz, Austria, July 11 – 13, 2012). Springer-Verlag, 363-370. DOI=10.1007/978-3-642-31522-0_55	France	Web accessibility means that people, disregarding of their abilities can access the Web.	W3C (2011)	
Chevalier, Dommes, and Martins (2013)	Chevalier, A., Dommes, A., & Martins, D. (2013). The effects of ageing and website ergonomic	France	Web accessibility is the inclusive practice of making websites usable by people of all abilities and		

	quality on internet information searching. <i>Ageing and Society</i> , 33(06), 1009-1035.		disabilities. (p1012)		
Calle-Jimenez, Sanchez-Gordon, and Lujan-Mora (2014)	Calle-Jimenez, T., Sanchez-Gordon, S. and Lujan-Mora, S. 2014. Web accessibility evaluation of massive open online courses on Geographical Information Systems. In <i>Proceedings of the Global Engineering Education Conference (EDUCON)</i> , 2014 IEEE (pp. 680-686). IEEE.	Ecuador Spain	Web accessibility means that persons with disabilities can use the web on an equal basis with others. (p680)		WCAG
Horton and Quesenbery (2014)	Horton, S. and Quesenbery, W. 2014. A web for everyone: Designing accessible user experiences. Rosenfeld Media, New York.	USA	... how easily and effectively a product or service can be accessed and used ... good accessibility is designed for the full range of capabilities, as well as for the context of use or environmental constraints. (p3)		WCAG
Modesto and Ferreira (2014)	Modesto, D. M. and Ferreira, S. B. L. 2014. Guidelines for search features development – a comparison between general users and users with low reading skills. In <i>Proceedings of the 5th International Conference on Software Development and Technologies for Enhancing Accessibility and Fighting Info-exclusion, DSAI 2013</i> . 27 (February 2014), 334-342. DOI= http://dx.doi.org/10.1016/j.procs.2014.02.037	Brazil	Web Accessibility is the use of Internet resources and access to information without barriers, regardless of cognitive, perceptual or physical capacities of a person. (p 335)		Henry (2007)
Park and Lim (2014)	Park, E. J., & Lim, H. (2014). A Study on the Evaluation of the Web Accessibility of a Domestic General Shopping Site with a High Number of Visits: Focusing on the Attributes of Alternative Texts with< img> Tags. <i>Advanced Science and Technology Letters</i> . 67, 17-20. DOI = http://dx.doi.org/10.14257/astl.2014.67.05	Korea	Web accessibility means that everyone can benefit from all available information services, regardless of disabilities. It refers to equitable access to services offered on web sites, regardless of a person's physical health or geographic location. (p17)		
Ramesh Babu and Chandra Sekharaiah (2014)	Ramesh B. J. and Chandra Sekharaiah, K. 2014. A panorama of web accessibility. <i>International Journal Of Computer Science and Mobile Computing (IJCSMC)</i> , 3(8) (August 2014), 311-317.	India	“Web accessibility refers to enabling the differently abled people to use the Web. More specifically, it is about enabling the DAP to perceive, understand, navigate, and interact with the Web” (p		Henry (2008) WCAG